$P_u = 490^k$

$M_{ux} = 90^k \times 1.5' = 135\ k\text{-ft}$

$M_{uy} = \frac{50^k \times 24}{4} = 300\ k\text{-ft}$

$P_r = P_{nt} + B_2 P_{lt}^{\to 0}$

$M_r = B_1 M_{nt} + B_2 M_{lt}^{\to 0}$

$\frac{\text{Y-AXIS}}{B_1} = \frac{C_m}{1 - \alpha P_r / P_{e1}}$

$C_m = 1 - 0.2 \frac{\alpha P_r}{P_{e1}}$ ← C-A-8.1

$P_{e1} = \frac{\pi^2 E (I_y = 931)}{(K_1 \times L = 1.0 \times 24 \times 12'')^2}$

$= 3212$

$I_x = 2400$

$C_m = 1 - 0.2 \times 490/3212 = 0.97$

$B_1 = \frac{0.97}{1 - \frac{490}{3212}} = 1.14$

$M_{ry} = 1.14 \times 300 \text{ k-ft} = 342 \text{ k-ft}$

$B_x \Rightarrow C_m = 0.6 - 0.4\left(0/135\right)$

$= 0.6$

$P_{e1_x} = \dfrac{\pi^2 E (I_x = 2400)}{(1 \times 24 \times 12)^2} = 8231$

$B_1 = \dfrac{0.6}{1 - 440/(P_{e1} = 8231)} = 0.64 \geq 1.0$

$M_{rx} = 135 \text{ k-ft}$

C_{bx} = 

$= 12.5(\quad)$

$2.5 + 0.25 \times 3 + 0.5(4) + 0.75(3)$

1.67

$b_x = \frac{0.709}{1.67} = 0.424 \geq 0.668 \times 10^{-3}$

$p = 0.566 \times 10^{-3}$

$b_y = 1.32 \times 10^{-3}$

$pP_x = 0.566 \times 490 = 0.28 \geq 0.2$

$pP_r = b_x M_{rx} + b_y M_{ry}$

$0.28 = (0.668 \times 10^{-3})(135) + (1.32 \times 10^{-3})(342)$

$= 0.82$ ok ✓

PROBLEM 4

-2 if 50 ksi used

$T = A_s f_y = 10.3 \times 70 \text{ ksi} = 721$ 3 points

$a = \frac{721}{0.85(5)(80)} = 2.12''$ 3 points

$M_n = 721^k \left(17.7/2 + 6'' - 2.12''/2\right)$

$= 9942 \text{ k-in}$ 4 points

$\phi M_n = 0.9 \times \frac{9942}{12} = 746 \text{ k-ft}$ 3 points

$\frac{w_L 2^2}{8} = 746 \text{ k-ft}$ 2 points

-2 if no 1.6 factor

$\frac{(1.6 \times w_L) \times 20^2}{8} = 746 \text{ k-ft}$

$w_L = 3.04 \text{ k/ft}$ 3 points

BY STRENGTH

DEFLECTION:

$$Y_{EHA} = \frac{10.3 \times \frac{17.7}{2} + \frac{721}{70} \times \left(17.7 + 6 - 2.12/2\right)}{10.3 + \frac{721}{70}}$$ 5 points

$= 324/20.6 = 15.7''$

$$I_{LB} = 510 + 103\times\left(15.7 - \frac{17.7}{2}\right)^2 + \frac{72}{70}\left(17.7 + 6 - \frac{2.2}{2} - 15.7\right)^3$$

5 points

$$510 + 483 + 496 = 1489\ in^4$$

-2 if 1.6 factor included here

$$\Delta = L/360 = \frac{35'\times 12''}{360} = 1.17'' = \frac{5\omega L^4}{384EI}$$

$$1.17'' = \frac{5\times\omega_L\times(35)^4\times 12^3}{384(29\times10^3)(1489\ in^4)}$$

4 points

$$\omega_L = 1.49\ k/ft$$

GOVERNS OVER 3.04 k/ft

3 points for correct conclusion